

Tcl Distributed Programming

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Introduction to Tcl/DP

On "zonker"

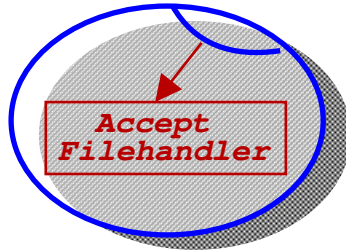
```
dpsH: MakeRPCServer 4545
4545
dpsH: set lastId 0
0
dpsH: proc GetID {} {
    global lastId
    incr lastId
    return $lastID
}
GetID
dpsH: GetID
1
dpsH: GetID
2
```

On another host

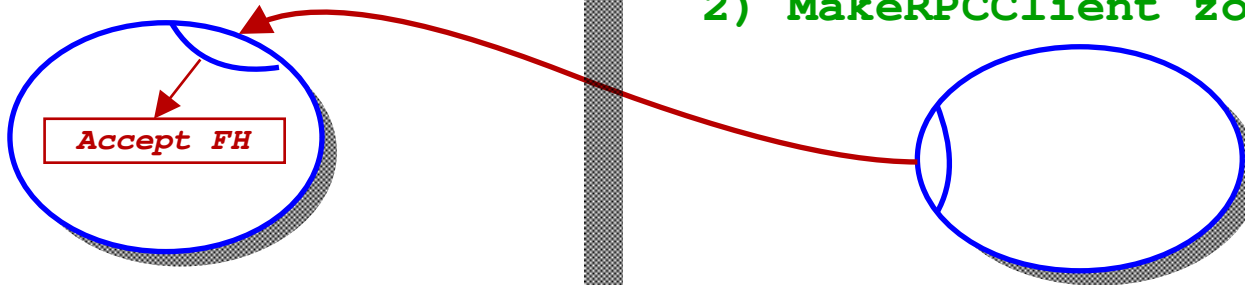
```
dpsH: set server [MakeRPCClient
zonker 4545]
file3
dpsH: RPC $server GetID
3
dpsH: time {RPC $server set a
5} 100
4332 microseconds per iteration
```

Internals

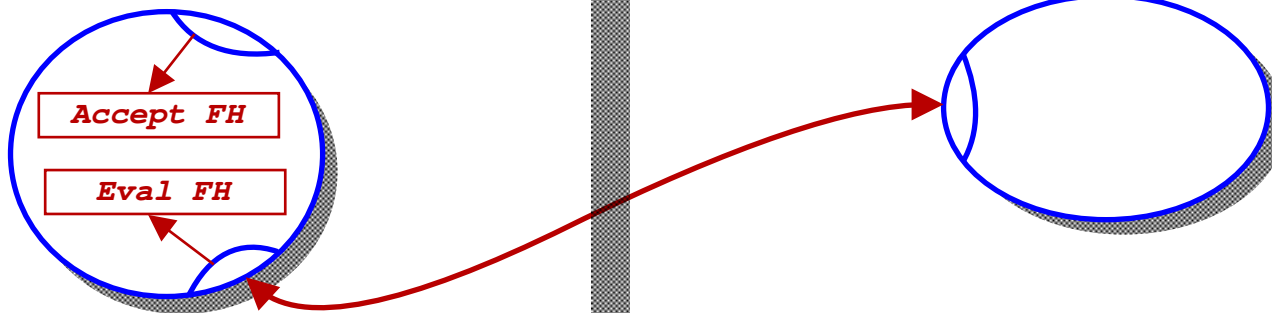
1) MakeRPCServer 4545



2) MakeRPCClient zonker 4545



3) Connection established!



Other Features

- RDO for concurrency

```
time {RDO file3 set a 5} 1000
```

0.5 milliseconds/iteration

```
RDO file3 -callback RDO_done parallelCmd
```

- Timeouts

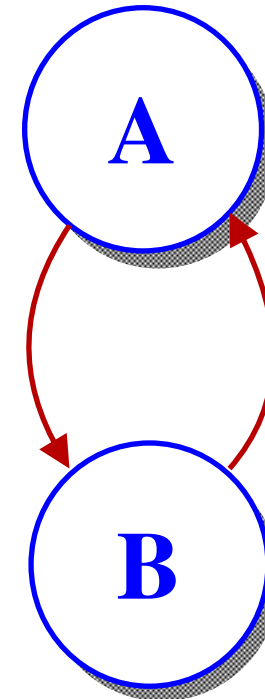
```
RPC file4 -timeout 1000
```

```
-timeoutReturn RPCTimeout
```

```
myCommand
```

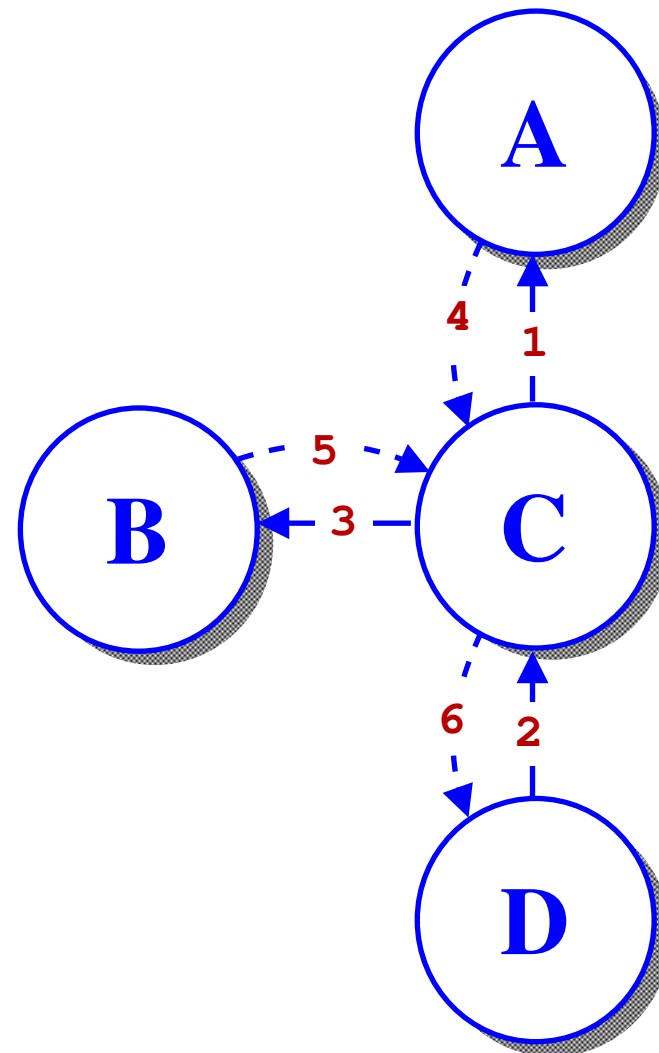
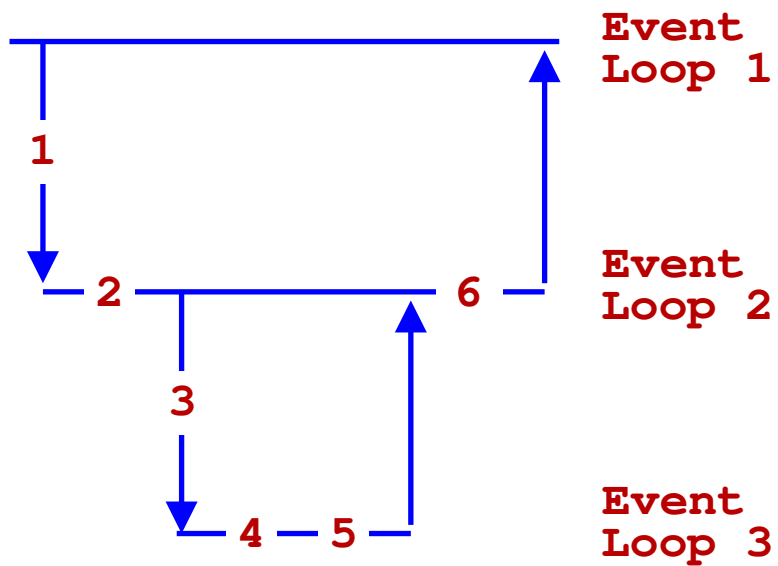
Deadlock Resolution

- **How deadlock happens**
 - 1) A calls B, reads socket for reply
 - 2) B receives RPC, and calls A--> **Deadlock!**
- **Solution: non-blocking RPC**
 - 1) A calls B, enters event loop
 - 2) B receives RPC, calls A, and enters event loop
 - 3) A receives RPC, evals and returns
 - 4) B finishes up and returns.
- **Can process more than RPC!**
Filehandlers, X, Idle, and Timer Events.



More Complex RPC Example

Process C



Object Protocol

- "Object" Messages

Creation: `point apt -x 5 -y 5`

Get All Slots: `apt config --> {{-x 0 5} {-y 0 5}}`

Get One Slot: `apt slot-value -x --> 5`

Set One Slot: `apt configure -x 9`

- Setting/Getting Slot Values

`setf object slotname value`

`getf object slotname`

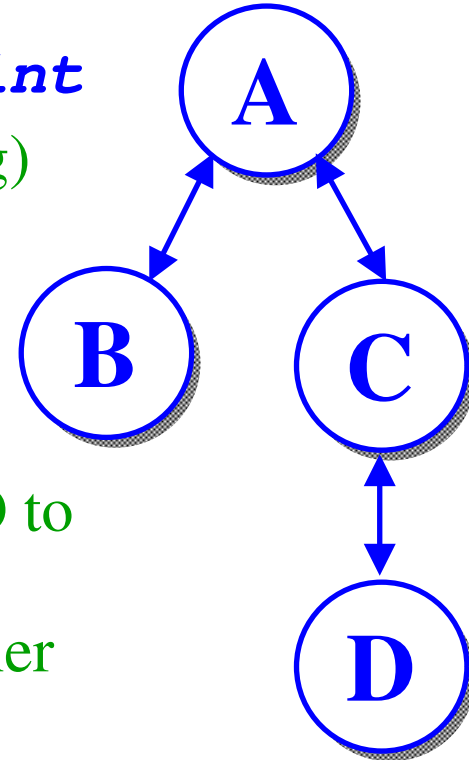
Distributed Objects

- **DistributeObject** *apt file4 point*
 - 1) Get all slot name/value pairs (using config)
 - 2) RPC to remote process to create object
 - 3) Keep table of object owners, clients
- **Setting A Slot**

If we own the object, send **downsetf** RDO to all clients

If we don't own, forward setf request to owner
- **Triggers**

Called on **downsetf** to eval some Tcl code



Open Issues

- **Security**
- **Multithreading**
- **Name Services**

